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| 09/941,988      | 08/30/2001  | Hirayoshi Tanei      | 566.40595X00        | 7616.            |

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| EXAMINER |
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BLACKWELL RUDASIL, GWENDOLYN A

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| ART UNIT | PAPER NUMBER |
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1775

DATE MAILED: 12/04/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

00013

**Office Action Summary**

Application No.

09/941,988

Applicant(s)

TANEI ET AL.

Examiner

Gwendolyn A. Blackwell-Rudasill

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) 3 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 4-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.*

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-2 and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent no. 6,338,893, Koder et al in view of United States Patent no. 5,652,042, Kawakita et al further in view of United States Patent no. 5,292,359, Jeng-Shyong et al.

Koder et al disclose a glass ceramic printed circuit substrate with a conductive paste printed thereon. The conductive paste is composed of "100 parts by weight of silver-platinum; 0.2 to 1 part of manganese dioxide; 0.2 to 1 part copper oxide; 0.3 to 1 part by weight of silicon dioxide; and 3 to 5.6 parts by weight of molybdenum and tungsten powder," (column 3, lines 56-62). A ceramic printed circuit substrate is made by forming a printed circuit made of the aforementioned conductive paste on green sheets that are composed of a glass ceramic

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containing a borosilicate glass, (column 4, lines 46-65). Koder et al also disclose that a conductive film containing a glass frit causes an excessive amount of glass to appear on the surface of a circuit conductor during firing which causes a reduction in bonding strength. Thereby requiring a conductive paste that does not contain glass frit, (column 3, lines 3-28). Specifically, examples 3-5 display, even without the use of silicon dioxide that solder wettability is at 100%, (Koder et al, Table 1, columns 7-8). Koder et al do not specifically disclose the surface area of the silver particles as exemplified by Applicant.

Kawakita et al disclose a conductive paste compound used for printed circuit boards. The conductive paste comprises 80-92 wt% of a conductive filler having a specific surface area of 0.1-1.5 m<sup>3</sup>/g, a liquid epoxy resin, and a hardener. At least one of gold, silver, palladium, copper, nickel, tin, and lead can be used as the conductive filler, (column 2, lines 15-35). The conductive filler is meant to be fired at the same time as the printed circuit board by heat and pressurization, (column 4, lines 34-37).

Jeng-Shyong et al disclose that "it is well known to those skilled in the art, the reduced specific surface area of the silver-palladium fine powders can prevent the occurrence of increased oil absorption, lowered oxidation resistance and other inconveniences," (column 1, lines 35-44). The silver-palladium conductive paste can be used for the production of electrode materials, contacts or the like used in the electronic industries, (column 1, lines 6-11).

Koder et al disclose a glass ceramic printed circuit substrate while Kawakita et al a conductive paste that can be used on a printed circuit board. It would have been obvious to one skilled in the art at the time of invention to modify the conductive paste of Koder et al with the particle size of the conductive paste of Kawakita et al, based upon the teaching of Jeng-Shyong

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et al to create a conductive paste wherein the silver particles can be dispersed with high concentration thereby maintaining conductive reliability, (Kawakita et al, column 4, lines 50-58). Although the conductive paste of Kawakita et al can be used for vias, it is known in the art the conductive pastes containing silver as well as palladium can be used as electrodes and contacts, (Jeng-Shyong et al, column 1, lines 6-11).

Although, Koder a et al do not specifically disclose that the temperature difference between the conductor paste and the softening temperature of the glass in the substrate have a difference of  $\pm 50^{\circ}\text{C}$ , it is demonstrated that the green sheets and the printed circuits can be printed at the same time, (Koder a, abstract). It would have been obvious to one skilled in the art at the time of invention to optimize the firing temperature through routine experimentation to narrow the firing shrinkage between a circuit conductor and the corresponding substrate by using a glass ceramic material as the substrate that exhibits stable shrinkage rates during firing, (column 4, lines 46-65).

#### ***Response to Arguments***

4. Applicant's arguments, see pages 7-10, filed September 22, 2003, with respect to claims 1-2 and 4-6 have been fully considered and are persuasive with regards to the Uchikoba et al reference.

5. Applicant's arguments filed September 22, 2003 have been fully considered but they are not persuasive with regards to Koder a et al.

Applicant contends that (1) Koder a et al uses silicon dioxide powder which is a prime component of glass which does not satisfy the no glass requirement of the presently claimed

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invention, (2) that simultaneous firing would not have disclosed the  $\pm 50^{\circ}\text{C}$  temperature difference limitation, (3) that other materials besides silver are used to improve the solder wettability and bonding strength that makes Koder et al technically different for the present invention, and (4) that unexpected results as to the combination of the temperature difference and specific surface area of the silver particles renders the present invention nonobvious.

As to the contention that silicon dioxide powder is a prime component of glass is correct as silicon dioxide is used as network former for glass compositions. However, silicon dioxide need not always be used for purposes of glass. Silicon dioxide can also be a ceramic material, which is not glass.

Although simultaneous firing does not explicitly show the temperature difference as exemplified by Applicant, it does show that conductive material and the, presintered, circuit board can be fired at the same temperature to obtain good wettability and adhesion. The purpose of Koder et al is to create a conductive paste that has excellent initial bonding strength, solder wettability and resistance to soldering heat of  $260^{\circ}\text{C}$ , (column 3, lines 44-46). When simultaneous firing is performed the glass component in the substrate Absent a showing to contrary, simultaneous firing is a strong indication that the conductive paste and substrate meet the  $\pm 50^{\circ}\text{C}$  difference limitation.

While other materials are used to help increase wettability and bonding strength, the present claims as written do not require that only silver or silver-platinum or silver-palladium be the only materials in the conductive paste.

It is known in the art to use silver particles having small specific surface area. It is also known in the art that a glass ceramic containing substrate used for a printed circuit board can be

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fired with a conductive paste containing silver particles having a specific surface are as exemplified by Applicant. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 (“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”). As such, present claims 1-2 and 4-6 stand rejected as disclosed above.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gwendolyn A. Blackwell-Rudasill whose telephone number is (703) 305-9741. The examiner can normally be reached on Monday - Thursday; 6:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (703) 308-3822. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gwendolyn A. Blackwell-Rudasill  
Examiner  
Art Unit 1775

GBR  
gbr

  
DEBORAH JONES  
SUPERINTENDENT EXAMINER